

PROLOGUE

Intelligent Tutor

In addition to the wide ranging exhibit and instructional activities of its field centers, NASA seeks to advance American education in another way: by employing the technology utilization process to develop a computerized, artificial intelligence-based Intelligent Tutoring System (ITS) to help high school and college physics students improve their problem-solving skills and overcome the anxieties of learning a difficult subject.

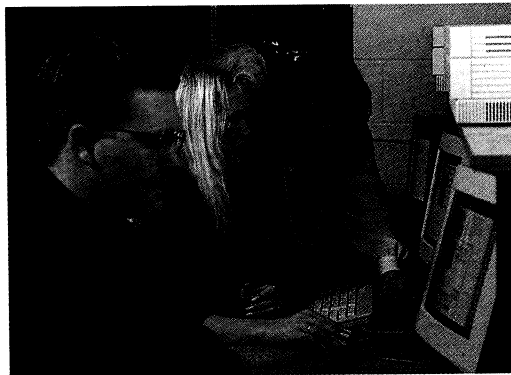
The tutoring system is designed for use with the lecture and laboratory portions of a typical physics instructional program. Its importance lies in its ability to observe continually as a student develops problem solutions and to intervene when appropriate with assistance specifically directed at the student's difficulty and tailored to his skill level and learning style.

Equipped with Apple Macintosh II computers, teacher Beverly Lee and Physics I class of Clear Creek High School, League City, Texas are providing the classroom environment for test and evaluation of the tutoring system, which is expected to lead to further refinements and expansion of its capabilities.

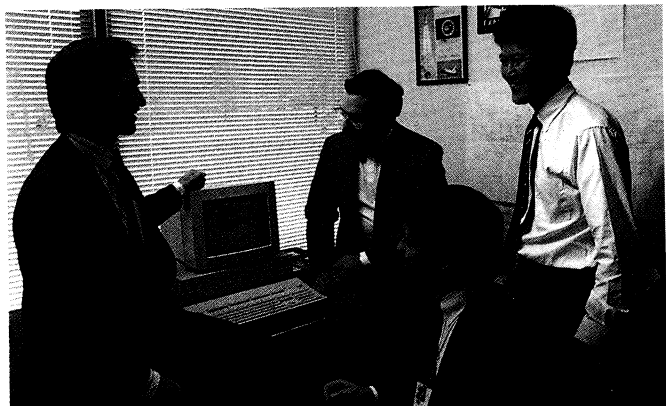
The ITS originated as a project of the Johnson Space Center (JSC) Office of Technology Utilization. It is being developed by JSC's Software Technology Branch in cooperation with Dr. R. Bowen Loftin, professor of physics at the University of Houston-Downtown (Texas). The program is jointly sponsored by NASA and ACOT (Apple Classrooms of Tomorrow), a research project of Apple Computer, Inc., Cupertino, California aimed at more focused and more effective uses of technology in education. Other organizations providing support for the project include the Texas Higher Education Coordinating Board, the National Research Council, Pennzoil Products Company and the George R. Brown Foundation.

The ITS is a spinoff product. It draws on technology earlier developed by the same project team—JSC's Software Technology Branch and Dr. Loftin—to integrate artificial intelligence into training/tutoring systems for NASA astronauts,

flight controllers and engineers. Success of the ITS will enable—after test, evaluation and refinement—mass production of the system for economical delivery to high schools and colleges throughout the nation. In addition, the spinoff may engender further spinoffs: the methodologies employed and much of the software developed can be used to produce other intelligent tutors for academic subjects that similarly demand application of problem-solving skills, such as mathematics, chemistry and engineering.



Teacher Beverly Lee (right) and her Clear Creek High School physics class are participating in a classroom environment test and evaluation of the Intelligent Tutoring System.



Principal investigator Dr. R. Bowen Loftin (center) discusses refinements to the tutoring system with members of the Johnson Space Center project team, who observe the classroom activities of Clear Creek High School students to determine what system improvements are needed to allow better student/tutor interface.